

STATE MINING AND GEOLOGY BOARD

1977 ANNUAL REPORT
TO THE
GOVERNOR AND THE LEGISLATURE

Adopted by the Board

January 13, 1978

State Mining and Geology Board
Department of Conservation
The Resources Agency
State of California



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THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION
STATE MINING AND GEOLOGY BOARD

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January 13, 1978

Edmund G. Brown Jr., Governor of California
James R. Mills, President Pro Tempore, California Senate
Leo T. McCarthy, Speaker, California Assembly

Gentlemen:

It is my honor to submit the 1977 Annual Report of the State Mining and Geology Board as required under Section 674, Article 3, Chapter 2, Division 1 of the Public Resources Code.

This Report outlines what the Mining Board feels are the most pressing, earth-science needs of the State and recommends programs to address these needs in the following categories:

- 1) Mineral Resource Inventory
- 2) Mined Land Reclamation
- 3) Geologic Hazard and Environmental Review of Major Projects in California
- 4) Reduction of Earthquake Hazards
- 5) Earth Science Data Base
- 6) Public Information
- 7) Improvement of Technical Support and Facilities

The Mining Board strongly feels that additional staff augmentation for the Division of Mines and Geology is required if the Division and the Board are to carry out the major new responsibilities placed on them by the Surface Mining and Reclamation Act of 1975 for mineral land classification and mined land reclamation. Additional staff support will also be required if the Division is to respond to increasing demands placed on it in providing geo-hazard and geo-environmental data and assessments to land use decision makers.

Respectively submitted,

Robert H. Twiss
Chairman

STATE MINING AND GEOLOGY BOARD'S ANNUAL REPORT
TO THE GOVERNOR AND LEGISLATURE
1977

INTRODUCTION

We herein present what we believe to be the most pressing needs of the State of California for data and services in the earth sciences with emphasis on mineral resources and mined land reclamation, earthquake and other geo-hazards, the geologic consequences of human activity on the environment, the earth science data base, and dissemination of earth science data to the public. These recommendations constitute our annual report to you pursuant to Section 674, Article 3, Chapter 2, Division 1 of the Public Resources Code. The principal agency for carrying out these recommendations is the Division of Mines and Geology in the Department of Conservation.

The Surface Mining and Reclamation Act of 1975 (SMARA) assigned additional important duties to the Division of Mines and Geology. Under the Act, mineral resource classification and conservation, and mined land reclamation became major new responsibilities for the Division and our Board. These are additions to the Division's continuing responsibilities in the fields of mineral resources research, environmental geology, earthquake and geologic hazards, basic geologic studies and public information. Some of the additional responsibilities have been met by appropriate shifts in program and personnel within the Division, but their magnitude and the technical skills required to deal with them will require additional augmentation of the Division staff and budget. In addition, the Board believes that the Division's current responsibilities require staff augmentation to meet new demands for earth-science information by land-use decision makers.

1. MINERAL RESOURCE INVENTORY

The Board recognizes the economic and social importance of identifying the State's mineral resources in advance of need, and in insuring that they will be available when required. This can be accomplished through a continuing mineral resource inventory beginning with classification and designation of mineral lands, under SMARA 1975 mandate, and progressing to the study and identification of mineral resources of future economic importance to California. Mineral energy-alternatives should also be an important part of this inventory.

- A. Mineral Land Classification Program - The Board feels that the present 5-year program to classify mineral lands threatened by uses incompatible with mining should be further strengthened through additional staff augmentation if present schedules are to be met. This program will also enable us to forcefully represent the State's position in important decisions such as those posed by Federal withdrawals in highly mineralized areas such as the Mojave Desert. Almost half of California is managed by the Federal Government and the State will have to exert a strong presence in these large areas if it is to protect its interest in the conservation and development of its mineral resources. This will require that the staff of the Division of Mines and Geology work in these areas on a continuing basis.

- B. Mineral Resources of Future Importance - The present Division of Mines and Geology mineral inventory program should be strengthened and directed towards the study and identification of mineral resources of future economic benefit to the State. Such studies, using the latest concepts in ore genesis and regional geochemical and geophysical work, would seek to define new districts containing potential mineral resources. This program should emphasize those industrial and metallic minerals most likely to be processed and consumed in California, thus creating local secondary industries and lowering the cost of mineral products to California industries and consumers.
- C. Alternative Energy Resources - The importance of having viable energy resources as alternatives to petroleum is recognized. Technological advances, such as in situ coal gasification and organic shale retorting, which might make heretofore marginal resources economic, also require that the State be aware of the economic and environmental impacts of developing these resources.

The Division of Mines and Geology, uniquely, can provide the State with an inventory of its non-petroleum mineral energy resources as well as determine the economic and environmental parameters that would be needed to utilize these resources in a responsible manner. Such a program, undertaken in coordination with other concerned agencies such as the Energy Commission, would:

- (1) Inventory known deposits and identify and assess potential resources of geothermal energy, peat, coal, uranium and thorium, and organic shale in California,
- (2) Outline the economic conditions under which these resources could be mined, and
- (3) Determine the environmental problems, including site reclamation, associated with the mining of these resources.

2. MINED LAND RECLAMATION

A high priority is assigned to investigations in mined land reclamation suitable to the specific and unusually varied geologic and climatologic conditions found in California. Much of the available research on mined land reclamation was conducted in the eastern and central states and is not directly applicable in California. These investigations, which should include experimentation and case studies, are needed to meet the Board's and the Division's statutory responsibility (Surface Mining and Reclamation Act of 1975) in the field of mined land reclamation, including the provision of knowledgeable advice and regulations on the subject to the State and to local lead agencies. In the absence of State standards, Federal legislative activity, such as the Surface Mining Control and Reclamation Act of 1977, can be expected. Nationwide standards imposed by the Federal Government may not be the best solutions for California. Section 675, Article 3, Chapter 2, Division 1 of the Public Resources Code authorizes the Board to provide for a statewide program to investigate technical aspects of reclaiming mined lands, to accept funds from the U.S. or any person to support it, and to independently and cooperatively pursue such research with any person, or public or private agency or organization. It is the intent of the Board to seek such support during 1978.

The minimal effort to meet the State's requirements, and the Board's statutory responsibilities for data on mined land reclamation specific to California's conditions, is estimated to be a 5-year program staffed by 4 research caliber (Ph.D. or equivalent experience) scientists and land use planners with appropriate sub-professional, laboratory and field support. The professional staff should consist of an economic geologist, an urban planner, an engineering geologist and a geomorphologist.

Inadequate mine abandonment and reclamation practices in past years have left many dangerous, unsightly or polluting abandoned mines in California. The Division of Mines and Geology should be assigned the responsibility and wherewithal to properly abandon, and where feasible reclaim, such mines where corporate, agency or individual responsibility for the unsatisfactory conditions cannot be determined or assigned. The proposed program, but not necessarily its method of funding, should be patterned on the successful program by which the Division of Oil and Gas plugs certain improperly abandoned, old oil and gas wells and cleans up certain wellsites in the State.

3. GEOLOGIC HAZARD AND ENVIRONMENTAL REVIEW OF MAJOR PROJECTS IN CALIFORNIA

The Division of Mines and Geology has been increasingly drawn into the decision-making process where development threatens to interact deleteriously with the geological environment or to create the potential for geologically-related problems or catastrophes. The Auburn and Warm Springs Dam controversies and the erosional consequences of forest practices are examples of recent Division involvement. Nuclear power plant siting, surface mine reclamation, and river and coastal zone management are examples of continued or expanded involvement. The Board urges full participation by the Division in appropriate major developmental issues of geo-hazard and environmental consequences in California. It believes that the Division's expertise and data resources can, and should be more effectively utilized in these decision-making processes. The Division is particularly suited for such an expanded role because neither it nor the Department of Conservation, of which it is a part, have construction or developmental responsibilities, leaving it inherently free of interest conflicts in making geo-environmental and geo-hazards assessments.

Division involvement in the decision-making process is almost certain to expand in the future because of two trends. The first is the greater demands being placed by man on the natural environment. These demands include the need, by our growing population, for living space, recreational areas, energy, minerals, and the products of California's forest, crop and grazing lands. The second trend is the creation of potential geology-related hazards through increasingly intensive, and perhaps at times uninformed land use and development, which will generate increasing demand for more earth science data and insights in the decision-making process. The environmental awakening of recent years will require that the full impacts of development and land use practices be examined in reaching decisions with significant geologic environmental and geologic hazard implications.

To meet present and anticipated responsibilities in the decision-making process, we urge that consideration be given to establishing within the

Division of Mines and Geology a continuing geologic hazard and geologic environmental program. This program should serve as a focus for geo-hazard and geo-environmental investigations and as a mechanism for bringing the Division's expertise to bear on important public issues with earth-science implications.

4. REDUCTION OF EARTHQUAKE HAZARDS

Recent advances in understanding (1) the processes by which earthquakes and related phenomena cause damage to buildings and structures, and loss of human lives; and (2) the geologic features and environments that are conducive to such hazards, have created optimism that much of the damage and most of the loss of lives caused by future earthquakes can be prevented. These advances include improved techniques for recognizing and mapping active faults and for predicting ground failure and strong ground motion during earthquakes. The routine application of such knowledge to the siting and design of buildings and structures will provide immediate as well as long-term amelioration of the earthquake hazard. Such studies are relatively inexpensive in comparison to the cost of alternative strategies such as earthquake prediction, and the results can be readily applied by the existing mechanisms of zoning ordinances and building codes.

The instrument networks and long-term observations by which earthquake predictions are sought are too costly to be undertaken as a major program by the Division of Mines and Geology. While the U.S. Geological Survey and the universities will undertake the major burden of research on earthquake prediction, the Division should participate cooperatively in these activities. If and when earthquake predictions are possible the Division will logically be called upon, and should be prepared, to implement a routine operational system for earthquake forecasting. The Division should also take a lead role in evaluating and responding to earthquake predictions generated by other institutions.

Two major Division programs on earthquake-hazard reduction mandated by legislation require high degrees of applied geophysical capability both in manpower and instrumentation. These programs are (1) the Special Studies Zones Program (Special Studies Zones Act); and (2) the Strong Motion Instrumentation Program (SMIP). The Special Studies Zones programs have so far been limited to the compilation of existing geological data, which are sometimes insufficient for an adequate determination of active fault traces. The SMIP has been actively installing and maintaining strong-motion instruments. The Board assigns high priority to the development of (1) new techniques on active fault mapping, and (2) a statewide ground response map. This task will require not only data from the strong-motion instrumentation program but also detailed knowledge of near surface geology. In the opinion of the Board, the Division needs additional instrumentation capabilities and manpower to carry out these mandated programs. This improved capability will also be useful in other Division programs such as mineral resource evaluation.

5. EARTH SCIENCE DATA BASE

The Division has recently emerged from a period when the State's needs seemed to require emphasis on engineering-geologic programs of chiefly local

focus. During this time the accumulation and recording of basic data on the geology and mineral resources of the State, and of the geologic forces which shape its terrain, was deemphasized. As a result, the basic documents on the geology and mineral resources of California need to be updated. These documents are prerequisites to the solution of major resource, environmental and engineering problems in the State and provide a valuable earth-science data base for informed governmental decision making.

- A. State Geologic Atlas - The Board recommends that an updating of the Geologic Atlas of California at a scale of 1:250,000 be undertaken as a priority program. This map series would replace the present Geologic Atlas, of the same scale, which was completed in 1969 and half of which is more than 15 years old. Since that time there have been major changes in geologic thought and methodology and a great increase in the acquisition rate of geologic knowledge. The older map series was in large part modeled after a 1938 edition which simplified stratigraphical column and minimal structural data. It is recommended that the new series begin with a totally revised legend in conformance with modern stratigraphical nomenclature, and include graphical portrayal of structural information.
- B. Supplemental Mapping - The basic geologic sheets of the State Atlas should be complimented with supplemental sheets at the same scale depicting geo-hazard information (active faults and earthquake epicenters, land subsidence potential, landslides, slope stability, expansive soils areas subject to flooding), mineral resource data (including metallogenic provinces), soil types, and aeromagnetic and gravity data. It is envisioned that the Atlas would provide a compendium of geologic information on which the public, industry and government could base land-use and development decisions.

The Board strongly recommends staff augmentation to complete the geologic portion of the program in a 7 year time frame with the supplementary mapping program being completed within a 14 year time frame.

6. PUBLIC INFORMATION

Two programs are recommended which would fill significant gaps in the present Division of Mines and Geology and Mining Board public information program.

- A. County Report Series - Most land use decisions in the populated and agricultural areas of California are made by counties and cities, although the Federal agencies manage most of the State's wilderness. The principal aim of a revitalized County Report series would be to prepare for each county an authoritative, periodically updated "geologic data transfer document" that would alert local and State decision makers to the significant natural geologic and seismic hazards and geologic environmental problems to be found in each county. The geology, mineral resources and construction materials resources and

needs of each county should also be emphasized. Such reports would be expected to consist of analysis of both existing and newly acquired data and draw on the Division's classification, geo-hazard, geo-environmental and regional mapping program.

B. Dissemination of Information on California Geology and Mineral Resources -

There is a great need among earth scientists in industry, government and the universities for a low-cost journal for the dissemination of new information on California geology and mineral resources. To keep costs at a minimum, the journal could use only author-supplied copy, simple technical review procedures, and minimum non-technical editorial review. It should publish manuscripts very quickly after receipt, and would probably be self-supporting. It would provide a focal point for timely papers on California geology and mineral resources, and quickly and widely disseminate new data and new ideas on these subjects. It would also provide a place for recording many important findings on these subjects, including research at state universities and in industry, that are now being lost because they are inappropriate for national or international scientific journals and have no appropriate publication outlet. Such a journal would substantially assist the Board to meet its responsibility under Section 676, Article 3, Chapter 2, Division 1 of the Public Resources Code to provide for a public information program on matters involving the State's terrain, mineral resources, mining, the reclamation of mined lands, and earthquakes and other geologic hazards.

It is recommended that an editorial board, consisting of members from industry, the universities, the geologic societies, the Division of Mines and Geology, and the Mining Board oversee the proposed journal to insure excellence, relevance to the needs of both society and the profession, and to encourage wide professional participation and readership.

7. IMPROVEMENT OF TECHNICAL SUPPORT AND DIVISION FACILITIES

The Division of Mines and Geology, as a geotechnical service agency, needs an in-house machine shop and electronic shop to maintain and develop instruments required to support the activities assigned to it by legislative mandate. A machine shop and an electronic shop are vital links by which problem-solving ideas can be transformed into workable reality.

The Board recommends that one machinist and one electronic engineer be added to the Division staff. The Board also recommends the establishment of an in-house machine shop and improved electronic shop facilities for the Division.

